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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MICHAEL SEUL

Appeal 2007-3274
Application 10/645,426
Technology Center 1600

Decided: December 20, 2007

Before ERIC GRIMES, LORA M. GREEN, and NANCY J. LINCK, *Administrative Patent Judges*.

LINCK, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a 35 U.S.C. § 134 appeal in the above-referenced case.[1] We have jurisdiction under 35 U.S.C. § 6(b). We affirm.

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[1] The application was filed June 21, 2003. The real party in interest is BioArray Solutions Ltd.

STATEMENT OF THE CASE

The field of the invention is materials science and analytical chemistry. The claimed subject matter is reflected in the following representative claim:

> 76. An array of several different particle-attached ligands, wherein different ligands are attached to different particles and said particles are encoded with a chemical or physical characteristic that permits identification of the ligand or ligands attached thereto and permits distinguishing of particles having different ligands attached thereto from each other, and wherein said particles are in a planar defined area on the surface of a substrate and wherein said particles are affixed to said substrate.

The Examiner has rejected claims 76-92 under 35 U.S.C. § 103(a) as follows:

I. Claims 76-84 and 86-90 based on Margel, U.S. Patent 5,652,059 (Jul. 29, 1997)[2] and Singer et al, U.S. Patent 5,573,909 (Nov. 12, 1996).

II. Claim 85 based on Margel, Singer, and Nacamulli et al, U.S. Patent 5,527,710 (Jun. 18, 1996); and

III. Claims 91 and 92 based on Margel, Singer, and Gombinski, U.S. Patent 6,297,062 B1 (Oct. 2, 2001).

The Examiner also has rejected claims 81-83 under 35 U.S.C. § 112, ¶ 2.

These claims read:

> 81. An array of proteins according to claim 78, wherein different proteins bind to different cell types.
>
> 82. The array of proteins according to claim 78, wherein the proteins are monoclonal antibodies.

[2] The dates in the citations to patents are issue dates.

83. An array of oligonucleotides according to claim 79 wherein the nucleic acids are DNA or RNA.

Claims 78 and 79 upon which these claims depend read:

78. The array of claim 76 wherein the ligands are proteins.

79. The array of claim 76 wherein the ligands are nucleic acids.

OBVIOUSNESS UNDER § 103(a)

The § 103(a) Issues

I. Claims 76-84 and 86-90 based on Margel and Singer:

Appellant contends Margel does not disclose "different particles . . . are encoded with a chemical or physical characteristic that permits identification of the ligand or ligands attached thereto and permits distinguishing of particles having different ligands attached thereto from each other" (claim 76). He further contends Margel does not disclose particles "in a planar defined area of the surface of a substrate" (*id.*). With respect to Singer, Appellant contends this reference does not disclose or suggest encoded microparticles "having different ligands attached thereto from each other" (*id.*). (Brief on Appeal (rec'd Sep 15, 2006) (hereafter "App. Br.") 4-5.)

The Examiner responds Margel teaches particles coated with different ligands and discloses "at least two different microperes each having different ligands coated thereon" (Supplemental Examiner's Answer (mailed April 12, 2007) (hereafter "Ans.") 8 (citing Margel, col. 2, l. 35 to col. 3, l. 5).) With respect to the "planar" issue, the Examiner points out that Margel's substrate can be a glass disc or a polypropylene film (*id.* (citing examples 1, 6, and 20)). Responding to Appellant's argument based on

Singer, the Examiner finds "Singer teaches that encoded microparticles can be distinguished individually; and that encoded microparticles having different ligand/target complement attached thereto are distinguishable from each other;" more specifically, Singer teaches microparticles "encoded or coated with a mixture of dyes that emits a detectably distinct spectral characteristic" (*id.* at 10 (citing Singer, col. 16, l. 54 to col. 17, l. 11)).

II. Claim 85 additionally requires the substrate to be a semiconductor electrode. The Examiner additionally cites Nacamulli for this limitation.

Appellant contends Nacamulli does not "disclose or suggest encoded, distinguishable particles" (App. Br. 6). The Examiner points out that Nacamulli is relied upon for the "teaching of a semiconductor substrate such as an electrode, not encoded, distinguishable particles" (Ans. 10). Thus, resolution of Issue I (*supra* pp. 3-4) will also resolve this issue.

III. Claims 91 and 92 further require "two or more of any of the arrays defined in claim 76 to 90" and "the location of each array on said substrate in combination with the chemical or physical characteristic indicates the types of ligands therein," respectively. The Examiner additionally cites Gombinski to address this limitation.

Appellant contends Gombinski does not address the deficiencies of Margel and Singer with respect to claim 76, upon which these two claims depend (App. Br. 8). Appellant further argues the three references' combination "would not make sense" because of "the vast differences in subject matter and encoding methods in each" (*id.*). Again, the resolution of Issue I will substantially resolve this issue as well.

Based on the contentions of Appellant and the Examiner, we frame the issue for decision as follows: Would there have been reason to combine the cited references, as done by the Examiner? And, if so, would the teachings of Margel and Singer have suggested to the skilled artisan an array of "different particles … encoded with a chemical or physical characteristic that permits identification of the ligand or ligands attached thereto and permits distinguishing of particles having different ligands attached thereto from each other" arranged in a "planar defined area . . . of a substrate"?

We discuss these issues with reference to representative claim 76.

Findings of Fact Relating to Obviousness

1. Claim 76 is to an "array of several different particle-attached ligands" (claim 76).

2. Giving claim 76 its broadest reasonable interpretation, the various references to "particles" and "ligands" refer to these entities as part of the claimed "particle-attached ligands" (see claim 76).

3. Thus, claim 76 requires the claimed particle-attached ligands to be composed of "different particles" and "different ligands," to be distinguishable from each other, and to be "affixed" to a planar defined area on the "surface of a substrate" (claim 76).

4. Margel discloses "a solid substrate having covalent bonds to . . . at least one species of microspheres containing residual reactive functions" on the "outermost layer" of the microspheres (col. 2, ll. 36-48).

5. Margel's "covalent bonds . . . may be provided by a ligand denoted '(A)', and the adjoining layers of the multiplicity of layers may be

covalently linked together by a connecting ligand denoted '(B)', the ligands (A) and (B) being the same or different from each other" (col. 2, ll. 48-53).

6. Margel discloses the microspheres "may consist of substantially a single species, or alternatively may consist of more than one species" (col. 2, l. 61 to col. 3, l. 4).

7. Margel discloses affixing microparticles to a glass disc, polyethylene or polypropylene film, or "Eliza [sic, ELISA] titer plates" (*e.g.*, Examples 1-6, 8-9, 20, and 31) or to semiconductive materials such as silicon (col. 3, ll. 44-49 & Example 7).

8. Margel teaches that the use of microsphere particles in ELISA improves the detection limits (col. 12, ll. 9-12) and therefore would have suggested the advantages of combining his teachings with other prior art.

9. Thus, Margel discloses or would have suggested an "array of several different particle-attached ligands" (FF 4-6) and further discloses or would have suggested affixing the particles in a "planar defined area on the surface of a substrate" (FF 7).

10. Margel is not relied upon for teaching or suggesting the claim 76 recitation "particles encoded with a chemical or physical characteristic that permits identification of the ligand or ligands attached thereto and permits distinguishing of particles having different ligands attached thereto from each other" (*see* Ans. 4).

11. Singer discloses an improvement upon the prior art methods of "detecting multiple analytes in a single sample using . . . two or more different fluorescent labels . . . detected at different wavelengths, where each emission spectrum is characteristic of a single analyte" (col. 2, ll. 13-21).

12. According to Singer, the challenge of these prior art methods was to obtain good separation of the fluorescent emission peaks when materials excited at the same wavelength and the Stokes shifts were small (col. 2, ll. 20-29).

13. Singer addresses this challenge by "labeling one or more target materials using surface coated fluorescent microparticles," each having "an external substance or coating (target complement) that is selective for each target material and an internal mixture of multiple fluorescent dyes to allow for controlled enhancement of the effective Stokes shift of the microparticle" (col. 4, ll. 37-57).

14. Singer's "microparticles, when used with a surface material that is selective for target molecules, provide labels having excitation and emission characteristics . . . useful for the detection of specified target molecules or combinations of target molecules" (col. 3, ll. 48-53).

15. "When more than one material is targeted simultaneously, multiple target complements (one for each target material) are optionally included on one microparticle or on multiple microparticles. . . . [M]icroparticles having detectably distinct spectral characteristics are used for each target material, with each individual microparticle being labeled with a different target complement" (col. 16, ll. 54-61; *see also* col. 16, l. 62-col. 17, l. 11 & Ans. 10).

16. Thus, Singer discloses or suggests "particles encoded with a chemical or physical characteristic that permits identification of the ligand or ligands attached thereto and permits distinguishing of particles having different ligands attached thereto from each other," i.e., different target

materials affixed to substrate and labeled with multiple fluorophore ligands that permit the ligands and therefore the different target materials, or particles, to be distinguished from each other (FF 11-15).

17. Both Margel and Singer disclose their microspheres as useful in detecting and analyzing target materials (*see* FF 4-9, 11-16) and thus would have suggested their combination, with a reasonable likelihood of success.

Discussion of the § 103(a) Issue

Based on our findings and those of the Examiner, we find the skilled artisan at the relevant time would have had reason to combine the cited references (FF 4-9, 11-16). Both Margel and Singer disclose the use of microparticles to detect target materials in assays, and both describe the advantages of their techniques. Thus, one skilled in the art, wanting to adapt the teachings of Singer to a planar surface, would have recognized merit in their combination. Alternatively, the skilled artisan, wanting to utilize the teachings of Margel to distinguish different particles from each other, would have reason to look to Singer. "When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In that instance the fact that a combination was obvious to try might show that is was obvious under § 103." *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1742 (2007).

We further find the combined teachings of Margel and Singer would have suggested to the skilled artisan an array of "different particles . . .

encoded with a chemical or physical characteristic that permits identification of the ligand or ligands attached thereto and permits distinguishing of particles having different ligands attached thereto from each other" arranged in a "planar defined area . . . of a substrate" (FF 7, 16).

Appellant's arguments to the contrary have been considered but fail to convince us the Examiner erred in concluding claim 76 would have been obvious to the skilled artisan. In this regard, we adopt and rely on the Examiner's responses to Appellant's arguments (see Ans. 7-12, particularly Ans. 10; *see also* FF 1-9, 11-16).

All Appellant's arguments are based upon the limitation of claim 76, i.e.,"different ligands are attached to different particles and said particles are encoded with a chemical or physical characteristic that permits identification of the ligand or ligands attached thereto and permits distinguishing of particles having different ligands attached thereto from each other" (App. Br. 6-8; Reply to Supplemental Examiner's Answer 1-4). Accordingly, we affirm the § 103(a) rejections of all the claims for the reason given above.

PATENTABILITY UNDER § 112, ¶ 2

The Indefiniteness Issues

The Examiner finds claims 81-83 indefinite under § 112, ¶ 2 due to lack of antecedent basis for the terms "proteins" (claims 81 and 82) and "oligonucleotides" (claim 83) (Ans. 3). According to the Examiner, these terms are "inconsistent with what is recited in the preamble of claims 76, 78 or 79, 'an array of several different particle-attached ligands'" (Ans. 7). The

Examiner also takes issue with the introductory phrase "An array" rather than "The array" (claims 81 and 83) (Ans. 3).

Appellant argues claims 81 and 82 depend on claim 78, "which recites that the ligands of claim 76 are proteins" (App. Br. 3). He further argues that claim 83 depends on claim 79, "which recites that the ligands of claim 76 are nucleic acids" (*id.*). Finally, he argues "An array" does not need to be changed to "The array" (*id.* at 4).

In view of these conflicting positions, we frame the § 112, ¶ 2 issue as follows: Do these claim terms provide sufficient antecedent basis such that claims 81-83 particularly point out and distinctly claim that which Appellant regards as his claimed invention?

Discussion of the Indefiniteness Issues

During prosecution, claims can be amended to more clearly point out and distinctly claim the subject matter an applicant regards as his or her invention. Thus, if claim language introduces uncertainty into the claim's interpretation, it must be clarified during prosecution to avoid issues during potential litigation down the road. Our reviewing court has made this clear:

> During patent examination the pending claims must be interpreted as broadly as their terms reasonably allow. When the applicant states the meaning that the claim terms are intended to have, the claims are examined with that meaning, in order to achieve a complete exploration of the applicant's invention and its relation to the prior art. . . . The reason is simply that during patent prosecution when claims can be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed.

In re Zletz, 893 F.2d 319, 321-22 (Fed. Cir. 1989).

In this case, while "protein" clearly has antecedent basis in the claim from which it depends, the same cannot be said of "oligonucleotide," appearing for the first time in claim 83. A ligand could be a single nucleic acid without being an oligonucleotide. Thus, with respect to these claim terms, we disagree with the Examiner regarding the term "protein" but agree with the Examiner regarding the term "oligonucleotide."

With respect to the introductory phrase "An array" appearing in claims 81 and 83, we agree with the Examiner this phrase renders these claims unpatentable under § 112, ¶ 2. Appellant cannot have it both ways—if there is antecedent basis for *the* claimed arrays, then "The" is the appropriate term for referring back to them, not "An."

Thus, we affirm the § 112, ¶ 2 rejection of claims 81 and 83 and reverse the § 112, ¶ 2 rejection of claim 82.

CONCLUSION

We affirm the § 103(a) rejections of claims 76-92. We also affirm the § 112, ¶ 2 rejection of claims 81 and 83. We reverse the § 112, ¶ 2 rejection of claim 82.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv)(2006).

AFFIRMED

Ssc:

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